Preventing Urinary Calculi

by Cheryl K. Smith

Those who keep wethers as pets (and sometimes bucks) need to be aware that they can sometimes develop urinary calculi (stones). These are an accumulation of minerals or other compounds that can cause trauma to the urinary tract and obstruct the flow of urine out of the body.

One reason calculi are more common in wethers and bucks is because of their physiology—the urethra is a common site for blockage.

Sometimes medication or simple surgery can solve the problem, but unless the root causes are found, the animal may need to have further surgery or eventually be euthanized.

Types of Calculi

Urinary calculi can be of various types. If a goat develops and is treated by a vet for urinary calculi, insist that the stones be sent for analysis. Further treatment and prevention may depend upon what caused the problem.

Three major types of calculi can cause problems in goats: phosphate, silica and calcium. Each of these may be caused by feed rations.

Phosphatic Calculi. Goats that eat rations high in phosphorus, such as cereal grains, can develop struvite (magnesium ammonium phosphate) calculi. Balancing the dietary calcium: phosphorus ratio is essential. Ideally it should be 2:1. Feed tags for the rations fed to goats list percentage of contents, so that is a good place to start.

Ruminant saliva is rich in phosphorus and the route of excretion for phosphorus is the gastrointestinal tract. When the goats are fed pelleted grain, they produce smaller amounts of saliva, which then decreases the gut excretion of phosphorus, sending more to the urinary tract.

Silica Calculi. This type of urinary stone mainly affects sheep and cattle that graze the native grasses of western North America. As the grasses mature, the silica content tends to increase. Since the silica is not broken down in the rumen or bloodstream, if the animals don't drink enough water, they can develop silica calculi.

Calcium-based Calculi. Calcium carbonate and calcium oxalate urinary stones are found most commonly in sheep grazing lush, fast-growing clover pastures. This is because they are loaded with calcium, but have a low phosphorus and high oxalate content. The combination of oxalate and calcium makes the calcium unavailable for absorption. This makes the urine alkaline and leads to the development of calcium-based stones.

In North America calcium-based stones have been found in goats that ate mainly alfalfa.

Castration

Wethers can be more prone to urinary calculi because they are castrated. Since castration at an early age has been shown to be a risk factor for development of urethral obstruction, avoid wethers that are castrated at less than three months, if possible.

A study done in cattle showed that although calculi can form in the urinary tracts of both bulls and steers, bulls may be able to pass a stone that would be likely to obstruct the urethra of a steer. This is because the testosterone produced by the bull makes the diameter of the urethra 25% bigger than that of a steer. This is probably also true in bucks and wethers for the same reason.

One author speculates that since males kept for breeding are more valuable than wethers, they would be less likely to be fed a calculus-producing diet and would have better access to water. Knowing many wethers that are kept as pets, I would consider this unlikely.

Water consumption

The most important factor in preventing urinary calculi is to increase the water consumption of the goat. Keep water bowls clean and fill them with fresh water frequently. If you use automatic waterers, use shallow containers that can be refilled rapidly.

Use heaters or plug-in buckets during the winter or make sure to give your goats hot water regularly to encourage more consumption. During the summer, make sure that the water is in a shady spot.

In a large herd, use multiple watering sites so that all goats, regardless of their position in the herd, have access.

Some people have found that flavoring the water with sugar-free drink mixes will increase the water intake of their animals.

According to Canadian studies, the mineral content or hardness of water does not play a significant role in causing stones.

Feed Ration

Wethers and bucks should be fed grass hay as their main source of forage, to prevent the development of calcium-based stones. Alfalfa and other types of legume hays contain more calcium than is healthy for them. Be aware that

avoiding these types of hay does not guarantee the prevention of urinary stones; a genetic influence may still lead to problems.

Wethers and bucks should also not be fed large quantities of grain; as noted above, this can lead to phosphate stones. Whatever you decide to feed, remember to balance the calcium and phosphorus.

Frequency of feeding

Because of chemical reactions that take place affecting urine concentration at each feeding, frequent or free-choice feeding is considered to be another factor in limiting urinary stones. Concentrated urine can cause urinary stones. Rather than feeding the goat once or twice a day, teach free-choice feeding from a young age, or give small portions several times a day.

Salt in the Diet

Increasing the salt concentration in the diet promotes more water intake, leading to more diluted urine. According to studies in Canada, loose or lick salt provided free-choice was found not to be adequate in preventing urinary stones in animals that were considered to be at risk for silica calculosis.

They found that mixing the salt directly into the feed was the most effective means of providing it to the animals. Corn chips with extra salt were suggested as a treat; adding extra salt to moistened feed was another method. Spraying a salt solution onto hay, for those that do not feed grain, also can be helpful.

The recommended amount of salt in the diet is 3-5% of daily dry matter intake.

Ammonium Chloride

Ammonium chloride is another option for preventing urinary calculi. It should be fed at a level of up to 1% of dry matter in the diet. The action of ammonium chloride is to reduce the pH of the urine (make it more acidic), which will make various types of urinary stones more soluble in the urine. Molasses should be avoided as a way to get the goat to drink more water or to make the ammonium choride more palatable, since its high potassium may make the ammonium chloride less effective. Sugar is a more effective alternative.

The downside of feeding a wether ammonium chloride over a long period of time is that it has been shown to reduce the mineral content in the bones in ewes. It may have the same adverse effect on a goat.

Conclusion

Urinary calculi can affect some goats and not others. Following these guidelines with all wethers is a good way to prevent the problem before it even gets started. If a wether does develop a problem, you can still take these necessary steps to prevent a recurrence in the animal and possibly save its life.

Source: Urolithiasis in Small Ruminants: Surgical and Dietary Management, by David C. Van Metre, DVM, DACVM, Colorado State University.

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